28. (Amended) A method of using a pressure sensor, the pressure sensor including:

a housing having an interior chamber;

a diaphragm sealing the interior chamber;

a deformable first measuring element coupled to the diaphragm; and

an arrangement coupled to the first measuring element, the arrangement being configured to generate a signal in response to a deformation of the diaphragm and to generate a signal in response to a deformation of the first measuring element;

the method comprising the step of measuring a pressure in a combustion chamber of a combustion engine through the deformation of the first measuring element, wherein the deformation of the first measuring element is responsive to the deformation of the diaphragm.

Remarks

With the cancellation of claims 23-27 and 50-71, claims 1-22 and 28-49 are now pending in the above-referenced application.

Claims 28-49 stand rejected under 35 U.S.C. § 112, ¶2, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In view of the amendment made to claim 28, withdrawal of this rejection is respectfully requested.

Claims 1-4, 6, 8-12, 18, and 21 stand rejected under 35 U.S.C. § 102(b) as being anticipated by United States Patent No. 4,926,695 to Kleven et al. ("Kleven"). Claims 13-17, 19, 20, 22, and 28-49 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kleven. Applicants have amended claims 1 and 28 to recite that the deformation of the first measuring element is responsive to the deformation of the diaphragm. Support for this amendment is found at least in Figure 1. The embodiment of Kleven serving as the basis for the rejection is illustrated in Figure 8. In this embodiment, a chamber 105 is bounded on one end thereof by diaphragm 118, which is itself pierced through by bimorph beam 115. The axis of beam 115 and the plane of diaphragm 118 are perpendicular to each other. Moreover, "diaphragm 118 is bonded to the bean 115 at their junction." Column 6, lines 51-52.

The bottom end of beam 115 is coupled to the top portion of sensing beam 101. As sensing beam 101 rocks from left to right back and forth, as illustrated by arrows 102, the force of this rocking is transmitted via beam 101 to beam 115, resulting in beam 115 being bent in tandem with the rocking motion of beam 101. Thus, one may say that the deformation of beam 115 is responsive to the deformation of beam 101. What one cannot say, however, is that the deformation of beam 115 is responsive to the deformation of diaphragm 118. In particular, although diaphragm 118 is flexible, it exhibits such flexibility in the axial direction, meaning that the diaphragm 118 bends up and down, not side to side as does beam 101. At most, this up and down deformation of diaphragm 118 results in the beam 115 being displaced up and down as well, but this possible up and down motion of beam 115 is not a deformation of beam 115. Unlike the claims as amended, the deformation of diaphragm 118 does not result in a bending or any other deformation of beam 115. Accordingly, unlike the claimed invention, the deformation of beam 115 is not responsive to the deformation of diaphragm 118. Withdrawal of this rejection is thus respectfully requested.

As for claims 2-4, 6, 8-22, and 28-49, these claims are patentable for at least the same reasons given in support of the patentability of claim 1.

Notwithstanding the above, Applicants submit the following additional reasons in support of the patentability of claims 3 and 4. Claim 3 recites a stop element configured to oppose a deformation force in response to a predetermined deformation of the first measuring element. Moreover, the Examiner believes that column 6, lines 42-52, shows a stop element, as recited in claim 3. This portion speaks of the manner by which beam 115 is joined at its ends to other components of the sensor of Figure 8. The top end of beam 115 is joined to diaphragm 118, and the bottom end is fixed inside recess 116. As explained above, the beam 115 is deformed by being bent left-to-right back and forth in tandem with the swaying of beam 101 represented in Figure 8 by arrows 102. Contrary to what the Examiner has stated, nothing in the sensor of Figure 8 can serve as a stop element because no component is configured to oppose this side-to-side deformation. The junction of the bottom of

beam 115 to beam 101 via recess 116 certainly does not serve this purpose because the purpose of that joining is to communicate the force acting on beam 101 to beam 115. This joining thus causes, not opposes, the deformation of beam 115. Moreover, although "diaphragm 118 is flexible in axial direction [*sic*] of the sensing beam and reduces the effect of axial movement of the isolated beam section 101B on the bimorph output," (column 6, line 67, to column 7, line 3), the kind of force that diaphragm 118 is opposing here is not a deformation of beam 115, since as explained above, the axial motion of beam 101 produces a similar displacement of location, but not distortion, of beam 115. Therefore, at most, diaphragm 118 is a stop for opposing a preselected amount of axial displacement caused by the motion of beam 101, but this cannot be considered a stop to a deformation of beam 115 because in this axial displacement that diaphragm 118 opposes, beam 115 is not being distorted. Instead of having its shaped changed during this axial movement caused by beam 101, beam 115 is at most being moved up and down axially without any change in shape. Therefore, because diaphragm 118 does not oppose any force that results in the changing of the shape of beam 115, it cannot be viewed as a meeting the stop element recited in claim 3.

As for claim 4, Applicants submit that this claim is patentable for at least the same reasons given in support of the patentability of claim 3.

Claim 5 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kleven in view of United States Patent No. 5,824,910 to Last et al. ("Last"). Similar to Kleven, Last also does not teach a stop element capable of opposing a deformation of a measuring element. In Last, pressure on silicon wafer 2 deforms wafer 2, which causes beam 4 to bend upwardly, resulting in a release of sliding element 16. There is nothing in Last that opposes the lift of this beam 4. Therefore, Last does not overcome the deficiencies noted above with respect to the absence in Kleven of a stop element for opposing a deformation of a measuring element. Accordingly, withdrawal of this rejection is respectfully requested.

Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kleven in view of United States Patent No. 5,317,917 to Dufour ("Dufour"). Claim 7 recites that the arrangement includes a piezoresistor connected to a

Wheatstone bridge. What the Examiner has established in relying on Dufour is the use in a pressure transducer of a Wheatstone bridge made up of piezoresistive gauges, but the Examiner has not shown a piezoresistor connected to such a Wheatstone bridge. Accordingly, because Dufour merely shows a Wheatstone bridge in a pressure transducer, and not a piezoresistor connected to the Wheatstone bridge, Applicants submit that claim 7 is patentable over the combination of Kleven and Dufour.

Applicants assert that the present invention is new, non-obvious, and useful. Consideration and allowance of the claims are requested.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Claims

Claims 1 and 28 have been amended as follows:

1. (Amended) A pressure sensor, comprising:

a housing having an interior chamber;

a diaphragm sealing the interior chamber;

a deformable first measuring element coupled to the diaphragm; and

an arrangement coupled to the first measuring element, the arrangement being configured to generate a signal in response to a deformation of the diaphragm and to generate a signal in response to a deformation of the first measuring element, wherein the deformation of the first measuring element is responsive to the deformation of the diaphragm.

28. (Amended) A method of using a pressure sensor, the pressure sensor including:

a housing having an interior chamber;

a diaphragm sealing the interior chamber;

a deformable first measuring element coupled to the diaphragm; and

an arrangement coupled to the first measuring element, the arrangement being configured to generate a signal in response to a deformation of the diaphragm and to generate a signal in response to a deformation of the first measuring element;

the method comprising the step of measuring a pressure in a combustion chamber of a combustion engine through the deformation of the first measuring element, wherein the deformation of the first measuring element is responsive to the deformation of the diaphragm.